TM 11-6625-1841-12

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

TELEPHONE TEST SET AN/FCM-15

HEADQUARTERS, DEPARTMENT OF THE ARMY

DECEMBER 1969

WARNING

Be careful when working on the 115-volt ac line connections. Serious injury or death may result from contact with these terminals.

DON'T TAKE CHANCES!

TECHNICAL MANUAL
No. 11-6625-1841-12

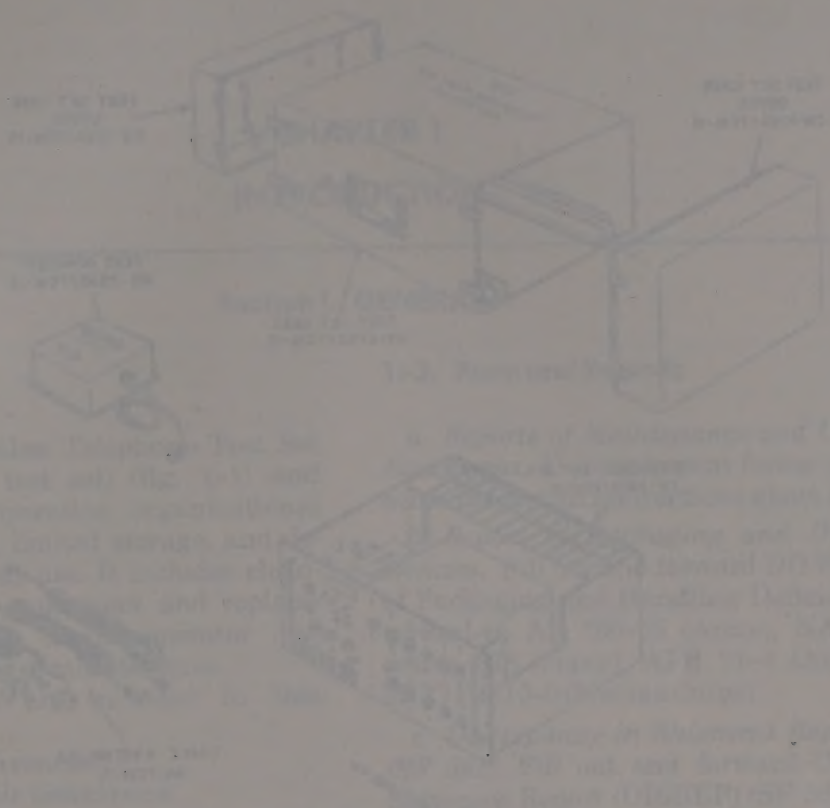
HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., *11 December 1969*

Operator and Organizational Maintenance Manual

TELEPHONE TEST SET AN/FCM-15

		Paragraph	Page
CHAPTER 1.	INTRODUCTION		
Section I.	General		
	Scope	1-1	1-1
	Indexes of publications	1-2	1-1
	Forms and records	1-3	1-1
II.	Description and Data		
	Purpose and use	1-4	1-1
	Nomenclature and common names	1-5	1-2
	Technical characteristics	1-6	1-2
	Components and dimensions	1-7	1-2
	Description	1-8	1-2, 1-3
	Additional equipment required	1-9	1-3
CHAPTER 2.	INSTALLATION		
Section I.	Service Upon Receipt of Equipment		
	Shelter requirements	2-1	2-1
	Packaging data	2-2	2-1
	Checking unpacked equipment	2-3	2-1
II.	Installation Instructions		
	Installation of test set	2-4	2-2
	Initial checking of equipment	2-5	2-2, 2-3
CHAPTER 3.	OPERATION		
Section I.	Operator's Controls and Indicators		
	Test set, controls and indicators	3-1	3-1, 3-2
	Test adapter, indicators	3-2	3-2
II.	Operating Instructions		
	Preliminary starting procedure	3-3	3-4
	Testing common equipment box	3-4	3-4, 3-5, 3-6
	Testing master switch panel	3-5	3-6, 3-7
	Testing auxiliary panel test	3-6	3-7, 3-8
	Testing dial line circuit card assembly	3-7	3-8
	Testing magneto line circuit card assembly	3-8	3-9
	Testing night alarm circuit card assembly	3-9	3-9
	Testing interrupter circuit card assembly	3-10	3-9, 3-10
	Stopping procedure	3-11	3-10
CHAPTER 4.	MAINTENANCE		
Section I.	Preventive Maintenance Instructions		
	Scope of operator's maintenance	4-1	4-1
	Preventive maintenance	4-2	4-1
	Preventive maintenance checks and services periods	4-3	4-1
	Daily preventive maintenance checks and services chart	4-4	4-1
	Weekly preventive maintenance checks and services	4-5	4-2
	Cleaning	4-6	4-2
	Touchup painting instructions	4-7	4-2
	Checking lamps	4-8	4-2, 4-3
	Checking audible alarm	4-9	4-3
	Checking interconnecting, power, and self-test cable assemblies	4-10	4-3
	Checking test adapter	4-11	4-3, 4-4

		Paragraph	Page
II.	Troubleshooting Charts		
	Organizational maintenance troubleshooting chart	4-12	4-4
	Replacement of parts	4-13	4-5
CHAPTER 5.	SHIPMENT, LIMITED STORAGE, AND DEMOLITION		
Section I.	Disassembly and Repackaging		
	Disassembly procedures	5-1	5-1
	Repackaging for shipment, or limited storage	5-2	5-1
II.	Demolition Procedures		
	Authority for demolition	5-3	5-1
	Methods of destruction	5-4	5-1, 5-2
	Priorities for destruction	5-5	5-2
APPENDIX A.	REFERENCES	----	A-1
B.	BASIC ISSUE ITEMS	----	B-1
C.	MAINTENANCE ALLOCATION	----	C-1



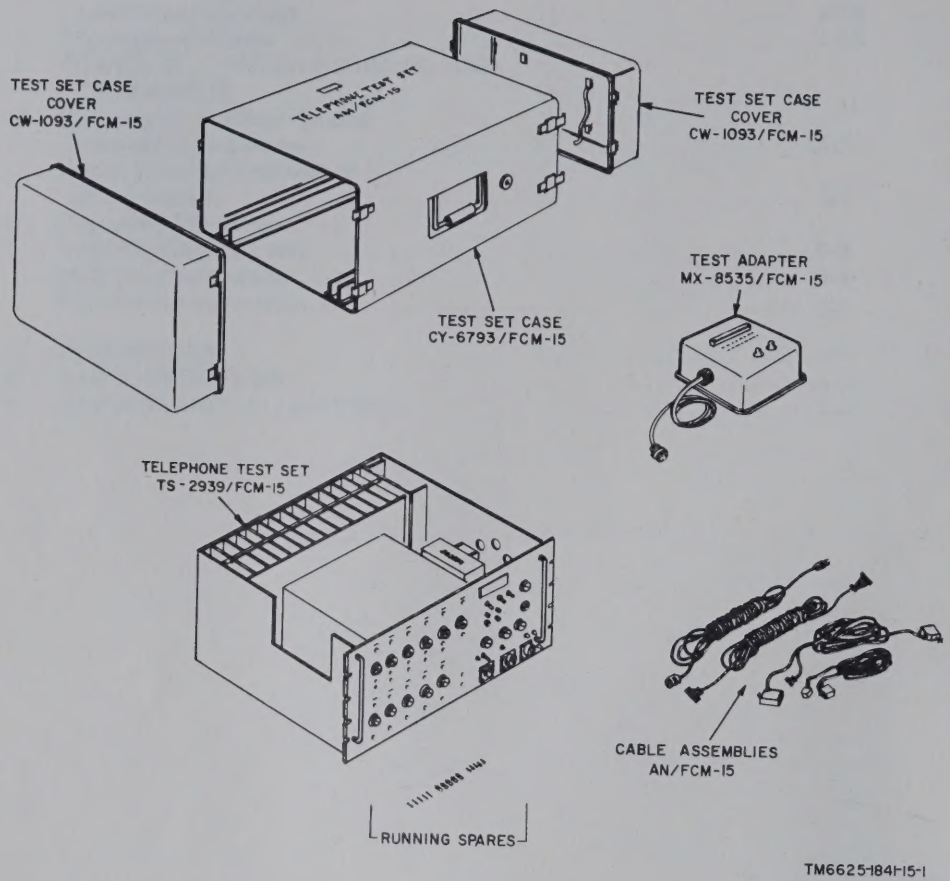


Figure 1-1. Telephone Test Set AN/FCM-15

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1-1. Scope

a. This manual describes Telephone Test Set AN/FCM-15 (portable test set) (fig. 1-1) and covers its installation, operation, organizational maintenance, shipment, limited storage, and demolition to prevent enemy use. It includes cleaning and inspecting the equipment and replacement of parts available to the operator and organizational categories of maintenance.

b. Three appendexes are included in this manual:—

(1) Appendix A, References.
(2) Appendix B, Basic issue items.
(3) Appendix C, Maintenance allocation.

c. The complete technical manual for the test set includes TM 11-6625-1841-35.

1-2. Indexes of Publications

a. DA Pam 310-4. Refer to the latest issue of DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to the equipment.

b. DA Pam 310-7. Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Form and Records

a. Reports of Maintenance and Unsatisfactory Equipment. Use equipment forms and records in accordance with instructions given in TM 38-750.

b. Report of Packaging and Handling Deficiencies. Fill out and forward DD Form 6 (Report of Packaging and Handling Deficiencies) as prescribed in AR 700-58 (Army), NAVSUP Publication 378 (Navy), AFR 71-4 (Air Force), and MCO P4610-5 (Marine Corps).

c. Discrepancy in Shipment Report (DISREP) (SF 361). Fill out and forward Discrepancy in Shipment Report (DISREP) (SF 361) as prescribed in AR 55-38 (Army), NAVSUP Publication 459 (Navy), AFM 75-34 (Air Force), and MCO P4610.19 (Marine Corps).

d. Reporting of Equipment Manual Improvements. Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding General, U. S. Army Electronics Command, ATTN: AMSEL-ME-NMP-EM, Fort Monmouth, N. J. 07703.

Section II. DESCRIPTION AND DATA

1-4. Purpose and Use

a. Telephone Test Set AN/FCM-15 provides means for testing Master Telephone Switch Panel TA-792/FCA-17, Auxiliary Telephone Switch Panel TA-793/FCA-17, and Common Equipment Telephone Switch Panel TA-794/FCA-17 (common equipment box). It includes Test Adapter MX-8535/FCM-15 to enable individual testing of circuit card assemblies which are part of the common equipment box. The test set can isolate trouble in the power supply and ringing generator which are also part of the common equipment box.

b. The test set can be used on a bench, or when removed from the transit case, installed in a standard 19-inch rack. Panel lamps and an alarm buzzer indicate the condition of equipment under test. In addition, the test set can also accept an external test instrument, such as an oscilloscope or voltmeter, through test point jacks for direct observation of waveforms and voltages. A branched cable assembly connects the internal circuits for self-testing.

1-5. Nomenclature and Common Names

A list of the nomenclature assignments for the components of Telephone Test Set AN/FCM-15 is given below. A common name is indicated after each item.

Item	*Common name*
Test Set, Telephone AN/FCM-15.	Portable test set
Case, Test Set CY-6793/FCM-15.	Transit case
Cover, Test Set Case CW-1093/FCM-15.	Cover
Test Set, Telephone TS-2939/FCM-15.	Test set
Adapter, Test MX-8535/FCM-15.	Test adapter
Cable Assembly, Special Purpose, Electrical, Branched CX-12213/FCM-15 (2'3").	Self-test cable assembly
Cable Assembly, Special Purpose, Electrical CX-12214/FCM-15 (3'3")	Input lines cable assembly
Cable Assembly, Power, Electrical CX-10793/FCA-17 (25 ft).	Power cable assembly
Cable Assembly, Special Purpose, Electrical CX-10792/U (3 ft).	Control cable assembly

[a] The portable test set and the test set perform the same functions. *Test set* is used as the common name when it is not necessary to distinguish if the test set is in its transit case or not.

1-6. Technical Characteristics

Lines tested ..... 11.
Test indicators ..... Lamps and audible alarm.
Power requirements ..... 115 vac ±10%, 50 or 60 Hertz single-phase.
Fuses ..... 3 ampere (2 each).
2 ampere (1).
Warmup time ..... None.
Duty cycle ..... Continuous.

1-7. Components and Dimensions (fig. 1-1)

a. Components. The components of Telephone Test Set AN/FCM-15 are listed in the following table:

Item	Height (in.)	Depth (in.)	Width (in.)	Unit weight (lb)
Case, Test Set CY-6793/FCM-15	12	18½	22	10
Cover, Case, Test Set CW-1093/FCM-15 (2 each)	12	3½	21¾	3
Test Set, Telephone TS-2939/FCM-15	10½	17	17	39
Adapter, Test MX-8535/FCM-15	1¾	4¾	4¾	1
Cable Assembly, Special Purpose, Electrical, Branched CX-12213/FCM-15			27	.8
Cable Assembly, Special Purpose, Electrical CX-12214/FCM-15			39	1.1
Cable Assembly, Power, Electrical CX-10793/FCA-17			300	6
Cable Assembly, Special Purpose, Electrical CX-10792/U			36	1
TM 11-6625-1814-12 (2 each) Set of running spares (*b* below)				.2

b. Running Spares. The following running spares are shipped with the test set:

Quantity	*Item*
5	Fuse, cartridge, 2-ampere, 250V, 3AG, Littelfuse 312002.
5	Fuse, cartridge, 3-ampere, 250V, 3AG, Littelfuse 312003.
3	Lamp, glow General Electric NE2D
4	Lamp, incandescent General Electric 394

1-8. Description (fig. 1-1)

a. The test set has four test capabilities; circuit card assembly testing, master switch panel testing, auxiliary switch panel testing, and common equipment box testing. The TEST MODE switch (fig. 3-1) completes the proper circuits for each of the testing modes.

b. The circuit card assembly test uses a test adapter which provides a connector for accepting the circuit card to be tested and a connector which mates with any one of three connectors on the test set. LINE, NIGHT ALARM, and INTERRUPTER switches activate various test circuits associated with the three connectors.

c. Testing the common equipment box and switch panels simulates actual telephone connecting group conditions. The common equipment box section of the test set includes 11 sets of rotary switches, 11 indicator lights, an alarm

buzzer, and 11 pushbutton switches which provide conditions comparable to those of an operating master or auxiliary switch panel. A set of circuit card assemblies, a power supply, and a ringing generator provide conditions comparable to those of an operating common equipment box. The front panel also has ringing generator and power supply load test switches. Test point jacks on the front panel facilitate connecting an external meter or oscilloscope for monitoring voltages, and waveforms.

d. The rear panel provides a convenience receptacle as well as connectors for the power cable assembly, the 3-foot control cable assembly, and the input lines cable assembly. A 2-ampere fuse protects the 115-vac power input; a 3-ampere fuse protects the +12-vdc circuit; and a 1-ampere fuse protects the —12-vdc circuit. The test set also includes a cable assembly for self-testing.

1-9. Additional Equipment Required

The following test equipments can be used with the AN/FCM-15 to check a Telephone Connecting Group AN/FCA-17 completely:

Equipment	*Purpose*	*Applicable publications*
Multimeter TS-352B/U	To observe resistance and voltage measurements.	TM 11-6625-366-15
Oscilloscope AN/USM-140A.	To observe waveforms	TM 11-6625-535-15

CHAPTER 2

INSTALLATION

Section I. SERVICE UPON RECEIPT OF EQUIPMENT

2-1. Shelter Requirements

The test set is designed for operation indoors protected from the elements. It can either be operated from a bench position or in a 19-inch rack. It must be within reach of a 115-volt, 50- to 60- Hertz ac power source (25 feet) and of the AN/FCA-17 to be tested (2 feet).

a. When used as a bench test set, a minimum 20- by 26-inch flat surface capable of supporting 64 pounds is required. Additional space is required for the test adapter. The front and rear covers are removed and the test set can remain in the transit case.

b. When rackmounted, the test set is removed from its transit case. Enough space must be allowed at the rear of the rack for connection of cables.

2-2. Packaging Data

The test set is packaged in an inner carton 22 1/2 by 18 by 13 inches in size. Its total weight is approximately 69 pounds. Straps in the front and rear covers retain the test adapter, running spares package, and various cables in place. Figure 2-1 shows a typical packing arrangement. It is only necessary to open the outer carton by slitting the waterproof tape, open the inner carton, and lift the portable test set out.

2-3. Checking Unpacked Equipment

a. Inspect the equipment for damage that may have occurred during shipment. If the equipment has been damaged, fill out and forward DD Form 6 (para 1-3*b*).

b. Check to see that the equipment is complete as listed on the packing slip. Report all discrepancies in accordance with instructions given in TM 38-750. The equipment should be placed in service even though a minor assembly or part that does not affect proper functioning is missing.

c. Check to see whether the equipment has been modified. If the equipment has been modified, the MWO number will appear on the front panel near the nomenclature plate. Also check to see whether all MWO's current at the time the equipment is placed in use have been applied.

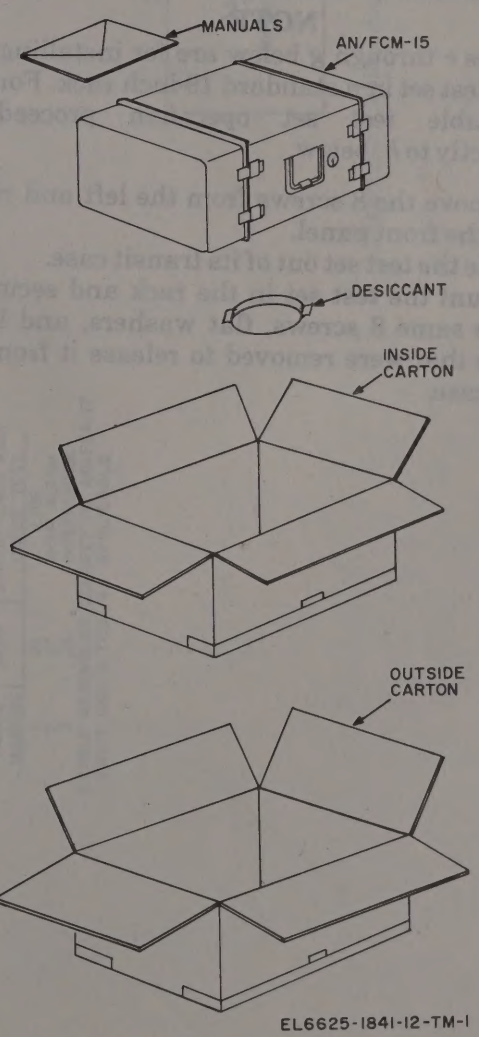


Figure 2-1. Typical packaging.

NOTE:

Current MWO's applicable to the equipment are listed in DA Pam 310-7.

d. Check the latest issue of DA Pam 310-4 and its latest changes to see whether you have the latest editions of all applicable maintenance literature.

Section II. INSTALLATION INSTRUCTIONS

2-4. Installation of Test Set

The procedure given below must be followed in sequence when installing the test set.

a. Set the test set on a desk high 20- by 26-inch flat surface, within easy reach of the connecting group and a 115-volt 50-to 60-Hz ac power source.

b. Remove the front cover and the test adapter and cable assemblies that are strapped inside.

c. Remove the rear cover and the cable assemblies that are strapped inside.

d. Remove the lamps and fuses (running spares) that are taped to the front panel and store them in a convenient location.

NOTE:

Steps *e* through *g* below are for installing the test set in a standard 19-inch rack. For portable test set operation proceed directly to *h*, below.

e. Remove the 8 screws from the left and right sides of the front panel.

f. Slide the test set out of its transit case.

g. Mount the test set in the rack and secure it with the same 8 screws, flat washers, and lockwashers that were removed to release it from its transit case.

h. Check that the POWER switch is in the OFF position (down) and connect one end of the power cable assembly to the POWER connector on the rear of the test set and the other end to a 115-volt 50- to 60-Hz power source (fig. 2-2).

i. Refer to chapter 3 for specific cabling as applicable for each test to be performed.

2-5. Initial Checking of Equipment

Perform the following checks on newly installed equipment.

a. Check that the power cable assembly connection is secure at the rear of the test set and at the power source.

b. Set the TEST MODE switch to COM EQUIP.

c. Set the POWER switch to the ON position.

d. Check that the POWER indicator light on the front panel glows.

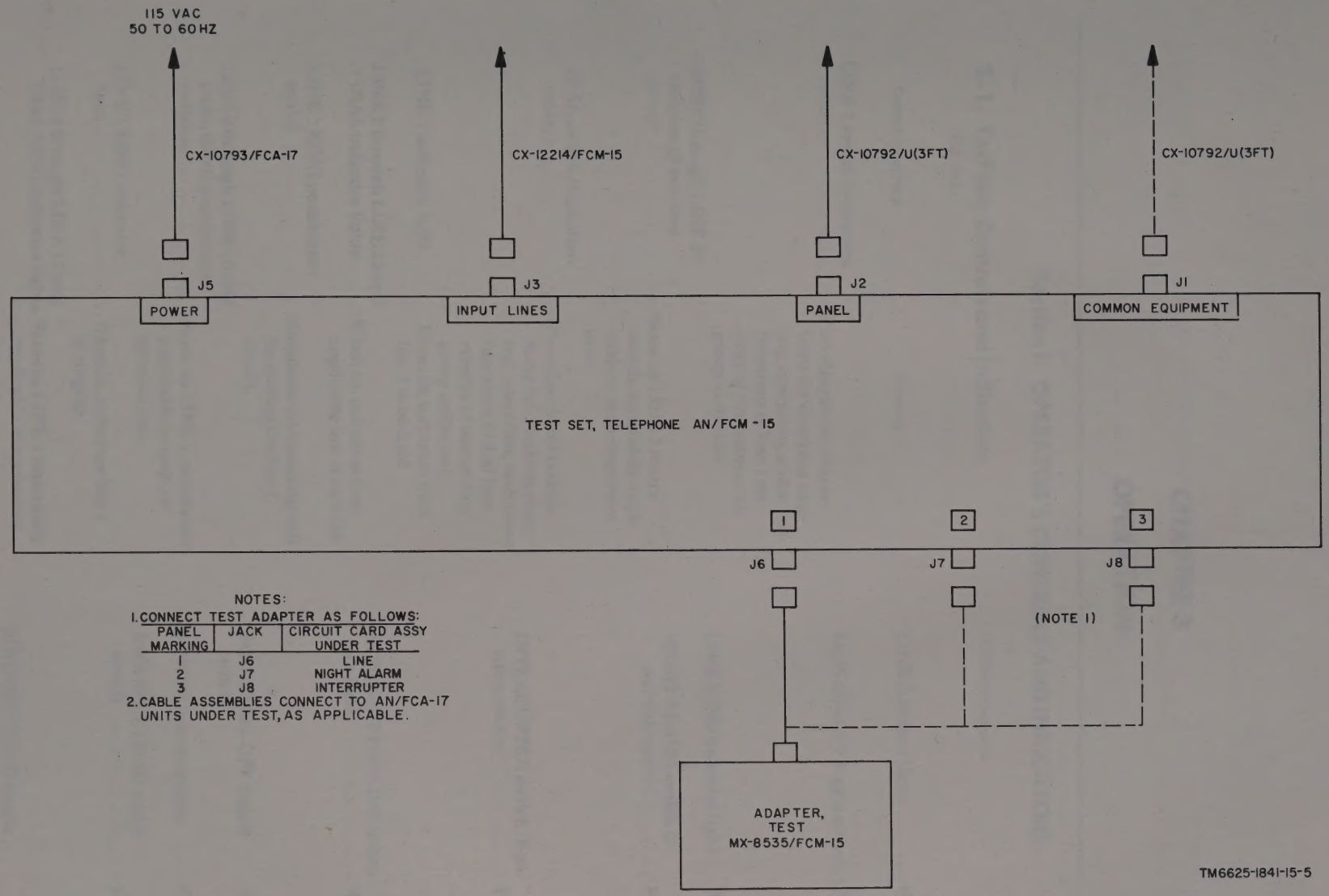
e. Set the POWER switch to OFF.

f. Connect the test adapter to any one of the three connectors on the front panel.

g. Set the POWER switch to ON.

h. Check that the +12V and —12V indicator lights on the test adapter glow.

i. Set the POWER switch to OFF.



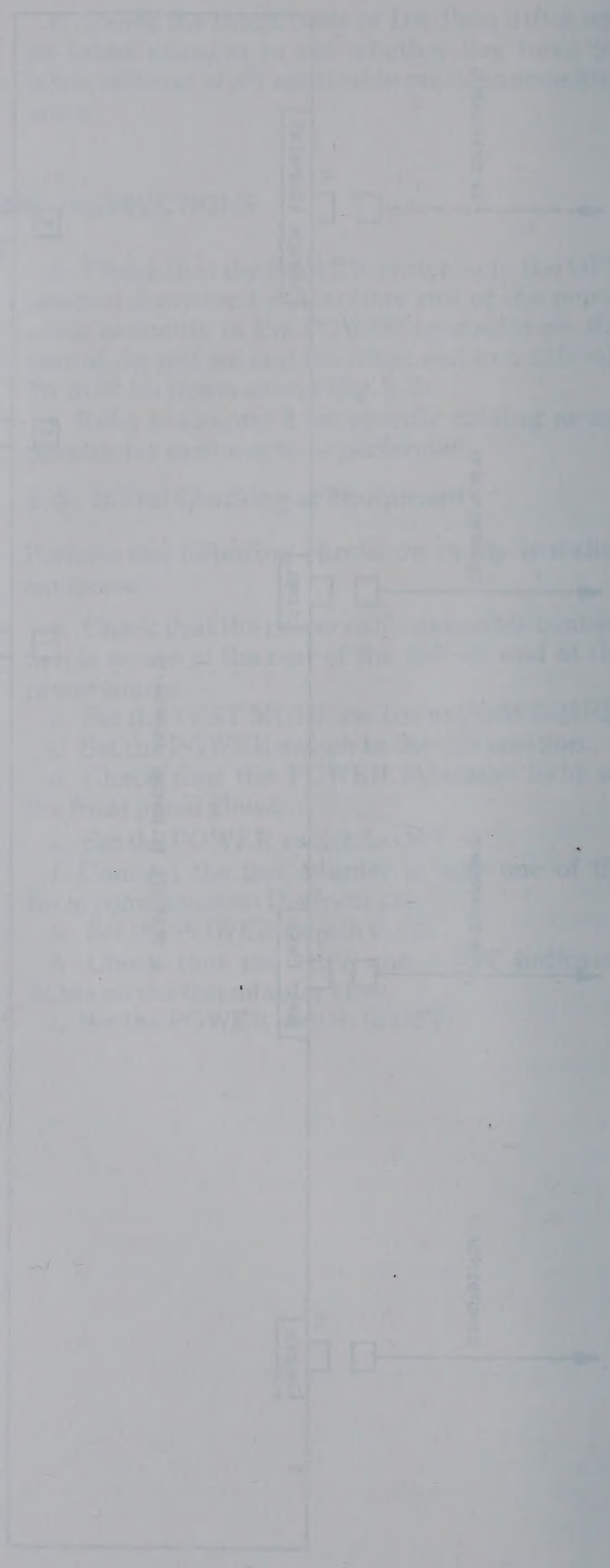
NOTES:

1. CONNECT TEST ADAPTER AS FOLLOWS:

PANEL MARKING	JACK	CIRCUIT CARD ASSY UNDER TEST
1	J6	LINE
2	J7	NIGHT ALARM
3	J8	INTERRUPTER

2. CABLE ASSEMBLIES CONNECT TO AN/FCA-17 UNITS UNDER TEST, AS APPLICABLE.

Figure 2-2. Cabling diagram.



CHAPTER 3

OPERATION

Section I. OPERATOR'S CONTROLS AND INDICATORS

3-1. Test Set, Controls and Indicators

(fig. 3-1)

Control or indicator	*Function*
LINE 1 switch (5-position rotary)	Provides circuit connections for checking ringing, operation, and alarm functions of line 1 circuits of the connecting group under test.
LINE 2 through LINE 10 switches (5-position rotary)	Same as LINE 1 rotary switch, separately applicable to each respective line.
DIAL switch (5-position rotary)	Provides circuit connections for checking ringing, operation, and alarm functions of dial line circuits of connecting group under test.
LINE 1 indicator light	When lit, indicates that line 1 is on hold
LINE 2 through LINE 10 and DIAL indicator lights	When lit, indicates that applicable line is on hold.
LINE 1 RING pushbutton switch	Simulates an incoming call for testing the line 1 circuit.
LINE 2 through LINE 10 and DIAL RING pushbutton switches	Same as LINE 1, separately applicable to each respective line.
LINE 1 RING indicator light	When lit, indicates line 1 is ringing.
LINE 2 through LINE 10 and DIAL RING indicator lights	Same as LINE 1 separately applicable to respective line.
LINE switch (4-position rotary)	Provides circuit connections to simulate operating conditions for testing individual magneto line and dial line circuit card assemblies.
LINE indicator light	When lit, indicates that line being tested is on hold.
LINE ON-OFF toggle switch	Provides circuit connections to simulate incoming call when testing individual magneto line and dial line circuit card assemblies.
LINE RING indicator light	When lit, indicates that line under test is ringing.
NIGHT ALARM switch (9-position rotary).	Provides circuit connections to simulate operating conditions for testing individual night alarm circuit card assemblies.
INTERRUPTER switch (9-position rotary)	Provides circuit connections to simulate operating conditions for testing individual interrupter circuit card assemblies.
INTERRUPTER LINE indicator light	When lit, indicates that the individual interrupter circuit card under test is connected into a held line.
POWER ON-OFF toggle switch	Applies and disconnects ac power from source to test set circuits.
POWER indicator light	Glows when power is applied to the test set.
PWR SPLY LOAD toggle switch	In on position, places load across power supply under test and connects power supply output to test points TP1 and TP2.
RING GEN LOAD toggle switch	In ON position, places load across ringing generator under test and connects ringing generator output to test points TP 3 and TP 4.

Control or indicator	*Function*
TEST MODE switch (4-position rotary).	Interconnects input cable assemblies with proper circuits for each type of test.
DIAL CHECK toggle switch	In ON position, connects circuits for oscilloscope monitoring of dial pulses as dial on handset is turned.
ALARM buzzer	Buzzes to indicate alarm circuit is operating.

3-2. Test Adapter, Indicators

(fig. 3-2)

Indicator	*Function*
+12 V indicator light	When lit, indicates +12V is applied to test adapter circuits.
—12V indicator light	When lit, indicates —12V is applied to test adapter circuits.

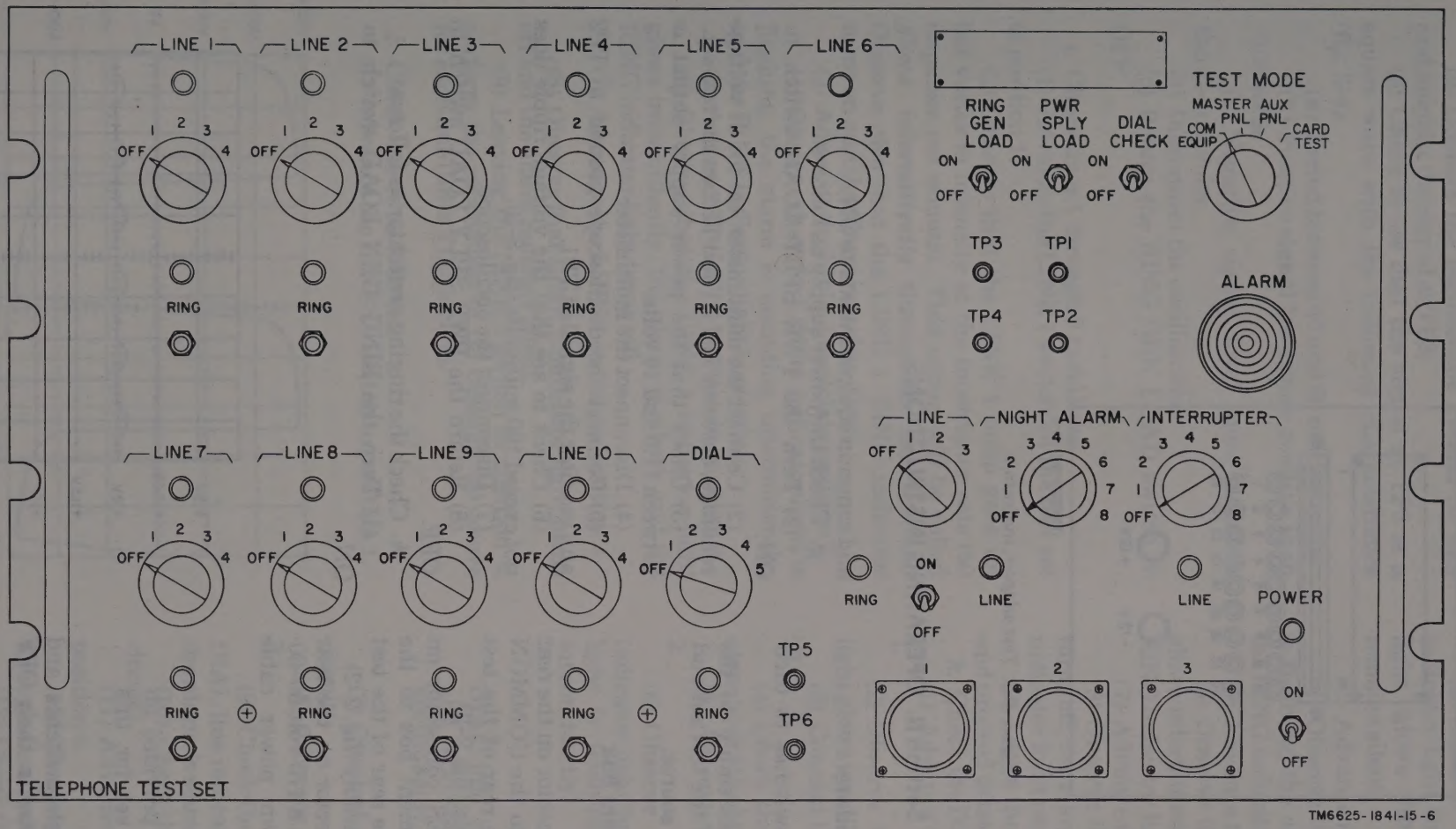


Figure 3-1. Test Set, controls and indicators.

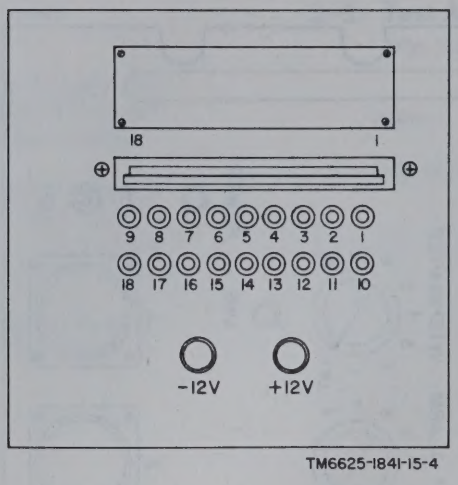


Figure 3-2. Test adapter, indicators.

Section II. OPERATING INSTRUCTIONS

3-3. Preliminary Starting Procedure

a. Set all rotary and toggle switches to their OFF positions.

b. Connect the power cable assembly to the POWER connector on the rear of the test set and to the 115-volt 50- to 60- Hz power source.

3-4. Testing Common Equipment Box

a. Connect the MASTER connector on the rear of the common equipment box to the COMMON EQUIPMENT connector on the rear of the test set with the control cable assembly (fig. 2-2).

b. Connect the INPUT LINES connector on the rear of the common equipment box to the INPUT LINES connector on the rear of the test set with the input lines cable assembly (fig. 2-2).

c. Connect the POWER connector on the rear of the common equipment box to a 115-volt 50-60-Hz power source with its own power cable assembly.

NOTE

A convenience receptacle is provided on the rear panel of the test set for this purpose.

d. Check to see that all toggle switches and rotary switches on the test set are in their OFF positions.

e. Set the TEST MODE rotary switch to COM EQUIP.

f. Turn POWER switches in both the test set and common equipment box to ON.

g. Check the power supply as follows:

(1) Turn the PWR SPLY LOAD switch to ON.

(2) Connect the multimeter, set for dc voltage readings, between TP1 (+) and TP2 on the test set.

(3) Check that the power supply output is between 11.5 and 14 volts.

(4) Disconnect the multimeter.

(5) Connect the oscilloscope ground to TP2 and monitor the signal at TP1.

(6) Check to see that the voltage ripple does not exceed 100 millivolts (fig. 3-3).

(7) Disconnect the oscilloscope.

(8) Return the PWR SPLY LOAD switch to OFF.

h. Check the ringing generator as follows:

(1) Turn the RING GEN LOAD switch to ON.

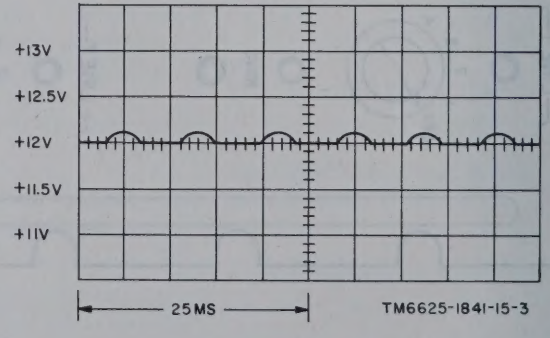


Figure 3-3. Power supply ripple output waveshape.

(2) Connect the oscilloscope ground to TP4 and monitor the signal at TP3.

(3) Check to see that the signal at TP3 is a square wave with the following characteristics (fig. 3-4):

(*a*) Period between 40 and 60 milliseconds.

(*b*) Positive signal level more positive than +100 volts.

(*c*) Negative signal level more negative than —100 volts.

(4) Disconnect the oscilloscope.

(5) Return the RING GEN LOAD switch to OFF.

i. Check lines 1 through 9 as follows:

(1) Advance the LINE 1 switch on the test set to position 1.

(2) Observe that the LINE 1 lamp goes on but varies in intensity at the interrupter rate (60 impulses per minute). This action will be called *glows intermittently* throughout the manual. Observe also that the LINE 1 RING indicator turns on and the alarm remains silent.

(3) Advance the LINE 1 switch to position 2.

(4) Observe that the LINE 1 indicator light is flashing, the alarm is sounding intermittently, and the RING indicator light is glowing.

(5) Advance the LINE 1 switch to position 3.

(6) Observe that the LINE 1 indicator light glows intermittently, the alarm is silent, and the RING indicator light turns off.

(7) Advance the LINE 1 switch to position 4.

(8) Observe that LINE 1 indicator light turns off and the alarm remains silent.

(9) Leaving the LINE 1 switch in position 4, perform the procedures of (1) through (8) above for each line (lines 2 through 9).

j. Check line 10 as follows:

(1) Advance the LINE 10 switch to position 1.

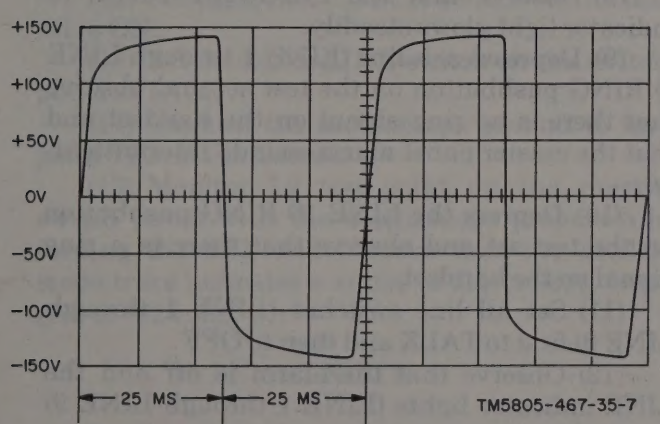


Figure 3-4. Output waveshape from ringing generator.

(2) Observe that the LINE 10 RING indicator light turns on, the LINE 10 indicator light glows intermittently, and the alarm remains silent.

(3) Advance the LINE 10 switch to position 2.

(4) Observe that the LINE 10 indicator lamp is flashing, the alarm is sounding steadily, and the RING indicator light remains on.

(5) Advance the LINE 10 switch to position 3.

(6) Observe that the LINE 10 indicator light glows intermittently, the alarm is silent, and the RING indicator light goes out.

(7) Advance the LINE 10 switch to position 4.

(8) Observe that the LINE 10 indicator light turns off, the alarm remains silent, and the RING indicator light remains off.

(9) Leave the LINE 10 switch in position 4, and proceed to test the DIAL line.

k. Check the DIAL line as follows:

(1) Advance the DIAL line switch to position 1.

(2) Observe that the DIAL line indicator light glows steadily.

(3) Connect the multimeter between TP5 and TP6.

(4) Check that the resistance is between 285 ohms and 315 ohms.

(5) Advance the DIAL line switch to position 2.

(6) Observe that the DIAL line RING indicator light turns on, the DIAL line indicator light is flashing, and the alarm is sounding intermittently.

NOTE

DIAL line indicator light flashing rate and ALARM intermittent sounding rate are the same.

(7) Check that multimeter indicates an open circuit.

(8) Advance the DIAL line switch to position 3.

(9) Check that RING indicator light goes out, DIAL line indicator light continues flashing, and the alarm is sounding intermittently.

(10) Check that multimeter indicates an open circuit.

(11) Advance the DIAL line switch to position 4.

(12) Observe that the DIAL line indicator light glows steadily, and the alarm is silent.

(13) Check that multimeter indicates an open circuit.

(14) Advance the DIAL line switch to position 5.

(15) Observe that the LINE indicator light turns off and the alarm remains silent.

(16) Remove the multimeter connections from TP5 and TP6.

(17) Turn the POWER switches on the common equipment box and the test set to OFF.

(18) Return all line switches in the test set to the OFF position.

(19) Reapply power to the common equipment box and test set.

(20) Observe that the alarm and all LINE indicator lights are off.

l. Check the auxiliary input as follows:

(1) Remove the cable from the MASTER connector on the rear of the common equipment box and connect the cable to the AUX 1 connector alongside it.

(2) Perform the procedures of *i* and *j* above.

(3) Remove the cable from the AUX. 1 connector on the rear of the common equipment box and connect the cable to the AUX. 2 connector to its right.

(4) Repeat the procedures of *i* and *j* above.

m. Turn the test set POWER switch to OFF.

n. Set all test set rotary and toggle switches to OFF.

3-5. Testing Master Switch Panel

a. Connect PANEL connector on the rear of the test set to the INPUT connector on the rear of the master switch panel with the input lines cable assembly.

b. Check that all toggle switches and all rotary switches on the test set are at OFF.

c. Set all LINE switches on the master switch panel to OFF.

d. Set the NIGHT ALARM switch on the master switch panel to ON.

e. Set the TEST MODE switch on the test set to MASTER PNL.

f. Turn the POWER switch on test set to ON.

g. Check lines 1 through 9 as follows:

NOTE

Unless otherwise specified, all switches and indicators referenced in the following steps are located on the switch panel under test.

(1) Hold the LINE 1 switch in RING position.

(2) Observe that LINE 1 indicator light is glowing intermittently, and NIGHT ALARM remains silent.

(3) Release the LINE 1 switch, allowing it to return to the OFF position.

(4) Observe that the LINE 1 indicator light is flashing.

(5) Set the LINE 1 switch to the TALK position.

(6) Observe that LINE 1 indicator light is glowing intermittently.

(7) Press the LINE 1 RING pushbutton on the test set and observe that there is an audible ring signal on the handset at the master switch panel.

(8) Return LINE 1 switch to OFF.

(9) Observe that the LINE 1 indicator light goes off.

(10) Perform steps (1) through (9) above for each line, LINE 2 through LINE 9.

h. Check priority LINE 10 as follows:

NOTE

Unless otherwise specified, all switches and indicators referenced in the following steps are located on the switch panel under test.

(1) Activate lines 1 through 9 by momentarily moving their line switches to the RING position.

(2) Observe that indicator lights for lines 1 through 9 on the switch panel are flashing.

(3) Hold the PRIORITY LINE 10 switch in the RING position.

(4) Observe that the PRIORITY LINE 10 indicator light is glowing steadily and the alarm is silent.

(5) Release the PRIORITY LINE 10 switch, allowing it to return to the OFF Position.

(6) Observe that the PRIORITY LINE 10 indicator light is flashing.

(7) Set the PRIORITY LINE 10 switch to the TALK position.

(8) Observe that the PRIORITY LINE 10 indicator light glows steadily.

(9) Depress each line (LINE 1 through LINE 9) RING pushbutton on the test set and observe that there is no ring signal on the handset and that the master panel alarm sounds intermittently.

(10) Depress the LINE 10 RING pushbutton on the test set and observe that there is a ring signal on the handset.

(11) Set all line switches (LINE 1 through LINE 9) first to TALK and then to OFF.

(12) Observe that the alarm is off and the LINE indicator lights (LINE 1 through LINE 9) are flashing.

(13) Set PRIORITY LINE 10 switch to OFF.

(14) Observe that LINE indicator lights (LINE 1 through LINE 9) continue flashing and the PRIORITY LINE 10 indicator light is off.

(15) Set LINE switches (LINE 1 through LINE 9) first to TALK and then to OFF.

(16) Observe that LINE indicator lights (LINE 1 through LINE 9) are off.

i. Check the DIAL LINE as follows:

NOTE

Unless otherwise specified, all switches and indicators referenced in the following steps are located on the switch panel under test.

(1) Turn the NIGHT ALARM switch to OFF.

(2) Depress the DIAL line RING pushbutton on the test set and then release the pushbutton.

(3) Observe that while the pushbutton is depressed, the dial line bell is not ringing, the DIAL LINE indicator light is flashing and the NIGHT ALARM is silent.

(4) Turn the NIGHT ALARM switch to ON.

(5) Observe that the alarm sounds intermittently and the DIAL LINE indicator light is flashing.

(6) Depress the DIAL line RING pushbutton on the test set and observe that the bell on the switch panel rings.

(7) Set the DIAL LINE switch to TALK.

(8) Observe that the NIGHT ALARM turns off and the DIAL LINE indicator light glows steadily.

(9) Depress the DIAL line RING pushbutton on the test set and observe that there is a ring in the handset.

(10) Set the DIAL LINE switch to OFF.

(11) Observe that the alarm is silent and the DIAL LINE indicator light turns off.

(12) Set the DIAL CHECK switch on the test set to ON.

(13) Set the DIAL LINE switch on the switch panel to TALK.

(14) Connect the oscilloscope ground to test point TP2 on the test set.

(15) Monitor L2 test point on the master switch panel with the oscilloscope probe while turning the dial, and observe that the oscilloscope trace indicates a series of dial pulses, from zero to +12 volts.

NOTE

The period of the pulses is between 80 and 120 milliseconds.

(16) Adjust the oscilloscope time base so that one period is equivalent to 10 time divisions.

(17) Observe that the positive part of the cycle lasts between 5 and 7 divisions.

(18) Turn the DIAL CHECK switch to OFF.

NOTE

Leave the oscilloscope ground connected to TP2 test point on the test set.

(19) Set the oscilloscope vertical gain to 1 volt per centimeter (100 millivolts per centimeter when using X10 probe.)

(20) Monitor L2 on the master switch panel with the oscilloscope probe while blowing into the handset mouthpiece and check that the signal is detected by the oscilloscope.

(21) Disconnect the oscilloscope.

(22) Turn the POWER switch on the test set to OFF.

(23) Connect the multimeter across L1 and L2.

(24) Check that the circuit is open.

(25) Disconnect the multimeter.

(26) Set all test set rotary and toggle switches to OFF.

3-6. Testing Auxiliary Panel Test

a. Connect the PANEL connector on the rear of the test set to the INPUT connector on the rear of the auxiliary switch panel with the control cable assembly (fig. 2-2).

b. Check that all rotary and toggle switches on the test set are at OFF.

c. Set all switches on the auxiliary switch panel to OFF.

d. Set the TEST MODE switch on the test set to AUX PNL.

e. Turn the POWER switch on the test set to ON.

f. Check lines 1 through 9 as follows:

NOTE

Unless otherwise specified, all switches and indicators referenced in the following steps are located on the switch panel under test.

(1) Hold the LINE 1 switch in RING position and observe that the LINE 1 indicator light glows intermittently and the alarm on the test set remains silent.

(2) Release the LINE 1 switch, allowing it to return to the OFF position, and observe that the LINE 1 indicator light flashes continuously.

(3) Set the LINE 1 switch to the TALK position and observe that the LINE 1 indicator light glows steadily.

(4) Depress the LINE 1 RING pushbutton on the test set and observe that there is an audible ring signal in the handset.

(5) Return the LINE 1 switch to OFF and observe that LINE 1 indicator light turns off.

(6) Perform the procedures of (1) through (5) above for each line (LINE 2 through LINE 9).

g. Check PRIORITY LINE 10 as follows:

NOTE

Unless otherwise specified, all switches and indicators referenced in the following steps are located on the switch panel under test.

(1) Activate lines 1 through 9 by momentarily depressing their line switches to the RING position and observe that the indicator lights for lines 1 through 9 are flashing.

(2) Hold the PRIORITY LINE 10 switch in RING position and observe that PRIORITY LINE 10 indicator light glows steadily and the alarm on the test set remains silent.

(3) Release the PRIORITY LINE 10 switch, allowing it to return to the OFF position, and observe that PRIORITY LINE 10 indicator lamp is flashing.

(4) Set the PRIORITY LINE 10 switch to the TALK position and observe that PRIORITY LINE 10 indicator light glows steadily.

(5) Depress each RING pushbutton, LINE 1 through LINE 9 on the test set, and observe that there is no ring signal on the handset but that the alarm on the test set sounds intermittently.

(6) Depress the LINE 10 RING pushbutton on the test set and observe that a ring signal is present on the handset.

(7) Set the line switches for all pushbuttons pressed in (5) above, first to TALK, and then to OFF, and observe that the alarm on the test set turns off and the line indicator lights for lines 1 through 9 start to flash.

(8) Set the PRIORITY LINE 10 switch to OFF and observe that line indicator lights, LINE 1 through LINE 9, continue to flash and the PRIORITY LINE 10 indicator light turns off.

(9) Set line switches, (LINE 1 through LINE 9), first to TALK and then to OFF and observe that each lamp turns off.

h. Turn the test set POWER switch to OFF.

i. Set all test set rotary and toggle switches to OFF.

3-7. Testing Dial Line Circuit Card Assembly

(fig. 2-2).

a. Check that all rotary and toggle switches on the test set are at OFF.

b. Set the TEST MODE switch on the test set to CARD TEST.

c. Connect Test Adapter MX-8535/FCM-15 to LINE card test connector 1 on the front panel of the test set (fig. 3-1).

d. Insert the dial line circuit card assembly into the recessed connector on the test adapter.

e. Turn the test set POWER switch to ON and observe that the —12 V and +12 V indicator lights on the test adapter glow.

f. Check the dial line circuit card assembly as follows:

(1) Set the LINE card test ring switch to ON and observe that the LINE card test RING indicator light turns on, the LINE card test LINE indicator light is flashing, and the alarm sounds intermittently.

NOTE

Flashing of LINE indicator light and intermittent sound of ALARM are at same rate.

(2) Turn the LINE card test RING switch to OFF and observe that the LINE card test RING indicator light turns off, the alarm continues sounding intermittently, and the LINE card test LINE indicator light is flashing.

(3) Advance the LINE card test switch to position 1 and observe that the LINE card test LINE indicator light glows intermittently, and the alarm turns off.

(4) Connect the multimeter between TP5 and TP6 and check that open circuit is indicated.

(5) Advance the LINE card test switch to position 2 and observe that the LINE indicator light turns off.

(6) Check to see that the multimeter indicates a resistance between 285 ohms and 315 ohms.

(7) Advance the LINE card test switch to position 3.

(8) Check to see that the multimeter indicates an open circuit.

(9) Disconnect the multimeter.

g. Turn the test set POWER switch to OFF.

h. Remove the dial line circuit card assembly from the test adapter.

i. Set all rotary and toggle switches to OFF.

3-8. Testing Magneto Line Circuit Card Assembly

a. Check that rotary and toggle switches on the test set are at OFF.

b. Set the TEST MODE switch on the test set to CARD TEST.

c. Connect Test Adapter MX-8535/FCM-15 to LINE card test connector 1 on the front panel of the test set (figs. 2-2 and 3-1).

d. Insert the magneto line circuit assembly card to be tested into the recessed connector on the test adapter.

e. Turn the test set POWER switch to ON and observe that the —12V and +12V indicator lights on the test adapter glow.

f. Check the magneto line circuit card assembly as follows:

(1) Set the LINE card test RING switch to ON and observe that the LINE card test RING indicator light turns on, the LINE card test LINE indicator light is flashing, and the alarm sounds intermittently.

NOTE

Flashing of the LINE indicator light and intermittent sounding of the alarm are at same rate.

(2) Turn the LINE card test RING switch OFF and observe that the LINE card test RING indicator light turns off, the alarm sounds intermittently, and the LINE indicator light is flashing.

(3) Advance the LINE card test switch to position 1 and observe the LINE indicator light glows steadily, and the alarm turns off.

(4) Advance the LINE card test switch to positions 2 and 3 in turn, and observe that the LINE indicator light turns off.

g. Turn the test set POWER switch to OFF.

h. Remove the magneto line circuit card assembly from the test adapter.

i. Set all test set rotary and toggle switches to OFF.

3-9. Testing Night Alarm Circuit Card Assembly

a. Check that all rotary and toggle switches on the test set are OFF.

b. Set the TEST MODE switch on the test set to CARD TEST.

c. Connect Test Adapter MX-8535/FCM-15 to NIGHT ALARM connector 2 on the front panel of the test set (figs. 2-2 and 3-1).

d. Insert the night alarm circuit card assembly to be tested into the recessed connector on the test adapter.

e. Turn the test set POWER switch to ON and observe that the —12V and +12V indicator lights on the test adapter glow.

f. Check the night alarm card assemblies in accordance with the chart below.

NOTE

For circuit card assemblies with only one alarm circuit (part number 100024-604-02, board A20 in the AN/FCA-17 common equipment box), use only switch positions 1 through 4; for those with two alarm circuits (part number 100024-604-01, boards A15 through A19 in the AN/FCA-17 common equipment box) use all eight switch positions.

NIGHT ALARM switch position	*Alarm*
1	Silent
2	Sounds intermittently
3	Sounds intermittently
4	Silent
5	Silent
6	Sounds intermittently
7	Sounds intermittently
8	Silent

g. Turn the test set POWER switch to OFF.

h. Remove the night alarm circuit card assembly from the test adapter.

i. Set all test set rotary and toggle switches to OFF.

3-10. Testing Interrupter Circuit Card Assembly

a. Check that all rotary and toggle switches on the test set are OFF.

b. Set the TEST MODE switch on the test set to CARD TEST.

c. Connect Test Adapter MX-8535/FCM-15 to INTERRUPTER connector 3 on the front panel of the test set (figs. 2-2 and 3-1).

d. Insert the interrupter circuit card assembly into the recessed connector on the test adapter.

e. Turn the test set POWER switch to ON and observe that the —12V and +12V indicator lights on the test adapter glow.

f. Check the interrupter circuit card assembly as follows:

(1) Advance the INTERRUPTER switch to position 1 and observe that the INTERRUPTER LINE indicator light is flashing and the alarm remains silent.

(2) Advance the INTERRUPTER switch to position 2 and observe that the alarm sounds intermittently and the INTERRUPTER LINE indicator light turns off.

(3) Advance the INTERRUPTER switch to position 3 and observe that the alarm sounds steadily and the INTERRUPTER LINE indicator light remains off.

(4) Advance the INTERRUPTER switch to position 4 and observe that the alarm continues to sound intermittently.

(5) Advance the INTERRUPTER switch to position 5 and observe that the alarm sounds steadily.

(6) Advance the INTERRUPTER switch to position 6 and observe that the alarm sounds intermittently.

(7) Advance the INTERRUPTER switch to position 7 and observe that the alarm sounds steadily.

(8) Advance the INTERRUPTER switch to position 8 and observe that the alarm sounds intermittently.

g. Turn the test set POWER switch to OFF.

h. Remove the interrupter circuit card assembly from the test adapter.

i. Set all test set rotary and toggle switches to OFF.

3-11. Stopping Procedures

a. Check that test set POWER switch is OFF.

b. Check that all rotary and toggle switches are OFF.

c. Disconnect the test adapter and secure it in the cover.

d. Disconnect the interconnecting cable assemblies and secure them in the cover.

e. Disconnect the power cable assembly from the power source.

f. If the test set is not rack mounted, secure the front and rear covers to the transit case.

CHAPTER 4

MAINTENANCE

Section I. PREVENTIVE MAINTENANCE INSTRUCTIONS

4-1. Scope of Operator's Maintenance

The maintenance duties assigned to the operator of Telephone Test Set AN/FCM-15 are listed below with a reference to the paragraphs covering the specific maintenance function. These procedures do not require special tools or test equipment.

a. Preventive maintenance checks and services (paras 4-3, 4-4, 4-5).

b. Cleaning (para 4-6).

c. Touchup painting instructions (para 4-7).

d. Checking lamps and audible alarm (paras 4-8 and 4-9).

e. Replacement of parts (para 4-13).

4-2. Preventive Maintenance

Preventive maintenance is the systematic care, servicing, and inspection of equipment to prevent the occurrence of trouble, reduce downtime, and assure that the equipment is serviceable.

a. Systematic Care. The procedures given in paragraph 4-6 cover routine systematic care and cleaning essential to proper upkeep and operation of the equipment.

b. Preventive Maintenance Checks and Services. The preventive maintenance checks and services (paras 4-4 and 4-5) outline functions to be performed at specific intervals. These checks and services are to maintain Army electronic equipment in a combat-serviceable condition; that is, in good general (physical) condition and in good operating condition. To assist the operator and organizational electronic equipment repairman, the chart indicates what to check, how to check, and the normal conditions. The *references* column lists the paragraphs that contain supplementary information. Records and reports of these checks and services must be made in accordance with the requirements set forth in TM 38-750.

4-3. Preventive Maintenance Checks and Services Periods

Daily preventive maintenance checks and services on the test set are performed in accordance with procedures given in paragraph 4-4; weekly checks are performed in accordance with procedures given in paragraph 4-5. The weekly checks should also be performed under the conditions given below.

a. When the equipment is initially installed.

b. When any unit is reinstalled after removal for any reason.

c. At least once a week if the equipment is maintained in a standby condition.

4-4. Daily Preventive Maintenance Checks and Services Chart

Check and service the test set when it is not needed for testing the connector group. Use the self-test cable assembly for all operational checks.

Sequence No.	Item to be inspected	Procedure	References
1	End item units	Inspect equipment for completeness.	Para 1-7.
2	Exterior surfaces	Clean test set, test set case and covers, and test adapter surfaces.	Paras 4-6 and 4-7.
3	Controls	While making operating checks observe that each switch is free of binding, and that there is no excessive looseness.	Fig. 3-1.
4	POWER, LINE, and RING indicator lamps.	Check for defective POWER, LINE, and RING indicator lamps.	Para 4-8.
5	Audible ALARM	Check for defective ALARM.	Para 4-9.
6	Operation	Operate equipment. During operation, be alert for any unusual signs or conditions that may indicate the possible beginning of trouble.	Paras 3-3 through 3-10.

4-5. Weekly Preventive Maintenance Checks and Services

a. The weekly checks include those performed daily (para 4-4). Also, a check for security of the mounting should be made for a rack-mounted test set. Tighten any loose nuts, bolts, or screws. Notify the organizational repairman to replace missing hardware as required.

b. Operate the equipment using the self-test cable. Connect the branched self-test cable to connectors J1, J2, and J3 (COMMON EQUIPMENT, PANEL, and INPUT LINES respectively) and perform the procedures of paragraphs 4-8 and 4-9. If a lamp or fuse defect is detected, perform the indicated replacement (para 4-13). If replacement does not correct the defect, refer the test set to organizational maintenance for troubleshooting (para 4-12).

4-6. Cleaning

Inspect the exterior surfaces of the test set and test adapter. They must be free of dust, grease and fungus.

a. Remove dust and loose dirt with a clean, dry, lintfree cloth.

WARNING

Trichloroethane fumes are toxic. Provide adequate ventilation. DO NOT use near a flame. Trichloroethane is not flammable but exposure to high heat in a poorly ventilated area can convert the fumes to a highly toxic gas.

b. Remove grease, fungus, and ground-in dirt from the test set and test adapter cases. Use a cloth dampened (not wet) with trichloroethane. Wipe dry with a clean cloth.

c. Remove dust and dirt from connector plugs and connector receptacles with a brush. If necessary, apply trichloroethane sparingly with the brush.

d. Clean the front panel and the control knobs, using a soft clean cloth. If dirt is difficult to remove, dampen the cloth with water; for more effective cleaning, use a mild soap.

4-7. Touchup Painting Instructions

Remove rust and corrosion from metal surfaces by lightly sanding them with fine sandpaper. Brush two thin coats of paint on the bare metal to protect it from further corrosion. Refer to the applicable cleaning and refinishing practices specified in TB 746-10.

4-8. Checking Lamps

(figs. 3-1 and 3-2)

a. Set the TEST MODE switch to COM EQUIP and all other switches to OFF.

NOTE

While performing the following checks, other operational indicators such as sounding of alarm may occur.

b. Connect the branched self-test cable as described in paragraph 4-5*b*.

c. Check the power indicator lamp on the front panel as follows:

(1) Set the POWER switch to ON.

(2) Replace the POWER indicator lamp on the front panel if it does not glow (para 4-13*a*).

d. Check the LINE 1 and RING indicator lamps as follows:

(1) Advance the LINE 1 switch to position 1.

(2) Replace the line one RING lamp if it does not glow (para 4-13*a*).

(3) Advance the LINE 1 switch to position 2.

(4) Replace the LINE 1 indicator lamp if it does not glow (para 4-13*a*).

(5) Rotate the LINE 1 switch to position 4.

e. Repeat the procedure in *d* above for each line, 2 through 10.

f. Check the dial line and RING lamps as follows:

(1) Advance the DIAL switch to position 1.

(2) Replace the DIAL line lamp if it does not glow (para 4-13*a*).

(3) Advance DIAL switch to position 2.

(4) Replace RING lamp if it does not glow.

(5) Rotate the DIAL switch to position 5.

g. Check the card test RING and LINE lamps as follows:

(1) Connect the test adapter to connector 1.

(2) Insert a known good magneto line circuit card assembly in the test adapter.

(3) Set the TEST MODE switch to CARD TEST.

(4) Place the card test LINE ring switch ON.

(5) Replace the card test RING lamp if it does not glow (para 4-13*a*).

(6) Replace the card test LINE lamp if it does not flash on and off (para 4-13*a*).

(7) Return the card test LINE ring switch to OFF.

h. Check the interrupter LINE lamp as follows:

(1) Connect the test adapter to connector 3.

(2) Insert a known good interrupter circuit card assembly in the test adapter.

(3) Set the TEST MODE switch to CARD TEST.

(4) Advance the INTERRUPTER test switch to position 1.

(5) Replace the interrupter LINE lamp if it does not flash on and off (para 4-13*a*).

(6) Return the INTERRUPTER switch to OFF.

i. Check the +12V and —12V lamps on the test adapter as follows:

(1) Place the POWER switch on the test set front panel at OFF.

(2) Connect the test adapter to any one of the three connectors provided on the test set.

(3) Turn the POWER switch ON.

(4) Replace the +12V or —12V lamp on the test adapter if it does not glow.

(5) Place the POWER switch at OFF.

4-9. Checking Audible Alarm

a. Connect the test adapter to connector 2.

b. Insert a known good alarm circuit card assembly in the test adapter.

c. Set the TEST MODE switch to CARD TEST.

d. Place the POWER switch in the ON position.

e. Advance the NIGHT ALARM switch to position 2.

f. Notify higher category of maintenance personnel to replace the audible alarm if it does not produce an audible signal.

g. Return the NIGHT ALARM switch to OFF.

h. Place the POWER switch in OFF position.

4-10. Checking Interconnecting, Power, and Self-Test Cable Assemblies

The four cables supplied with the telephone test set can, if trouble in the cable is indicated, be checked by use of the ohmmeter section of the multimeter, If continuity is not obtained where indicated or if wires are shorted to each other, replace the cable and forward the defective cable to higher category of maintenance for repair.

a. Power Cable Assembly. There should be continuity from the round ground terminal to B of the connector and from A and C to the flat plug prongs. There should be no continuity between any of the terminals.

b. Input Lines Cable Assembly. There should be continuity between similarly lettered terminals at each connector. However, only terminals A through Z (less G, I, O, and Q) are used. There should be infinite resistance between other terminals. There should be no continuity between any terminals at the same plug.

c. Control Cable Assembly. There should be continuity between similarly numbered terminals at each connector. The connectors are numbered from 1 to 104. The following terminals do not have wires attached and should indicate infinite resistance: 53, 58, 69, 74, 75, 78-83, 88, 90, 92-97, and 102-104.

d. Self-Test Cable Assembly. The self-test cable assembly has three ends. Connector P3, which mates with INPUT LINES connector J3 of the test set, has 22 wires (terminals A to Z, less G, I, O, and Q) which are connected to terminals 1 through 22 of both P1 and P2. No other terminals of P3 should show continuity to P1 or P2. On P1 and P2, each of which is numbered from 1 to 104, there is continuity from like-numbered terminals with the same exceptions as noted in *c* above for the control cable assembly.

4-11. Checking Test Adapter

(fig. 3-2)

The test adapter can be checked completely by continuity as follows:

a. There should be 0 ohms between each of the J1 (card receptacle) connector pins and the corresponding jacks. As indicated on the panel, the connector pins are numbered from 1 to 18, reading from right to left.

b. There should be infinite resistance between each of the 18 jacks when the —12V and +12V lamps are removed from their sockets. If the lamps are left in their sockets, there will be a very low resistance (through the lamps) between jacks 15, 17, and 18.

c. There will be continuity between cable connector P1 and the jacks as shown in the following chart:

P1 connector terminal	*Jack label*
A	1
B	2
C	3
D, d	4
E, V	5
F, X	6
G	7
H, Y	8

P1 connector terminal	*Jack label*
J	9
K	10
L	11
M	12
N	13
P	14
R (0 ohms) and T, U (low reading).	15
S	16
T (0 ohms) and R, U (low reading).	17
U (ohms) and R, T (low reading).	18

d. The following pairs of terminals of P1 have direct (0 ohms) continuity: b to c, a to z, D to d, E to V, F to X, and H to Y. All other combinations, with the exception of R, T, and U involved with the lamps on the test adapter should have no continuity.

Section II. TROUBLESHOOTING CHARTS

4-12. Organizational Maintenance Troubleshooting Chart

a. When checking a unit of the AN/FCA-17 (paras 3-4 through 3-10), and it is not certain if an incorrect response is due to the unit under test or to a defect in the test set, perform the applicable lamp checking procedures in paragraph 4-8. If replacing lamps does not correct the trouble, refer the test set to higher category of maintenance for repair.

b. The chart below is furnished to help localize the trouble in Telephone Test Set AN/FCM-15. Only those corrective measures that organizational personnel can accomplish are given. If the measure suggested does not restore normal equipment performance, refer the equipment to higher category of maintenance for repair.

Item No.	Trouble symptom	Probable trouble	Corrective measures
1	Power indicator lamp on front panel not lit and test set is not operable.	*a.* Defective 2-ampere fuse on test set.	*a.* Check fuse, replace if necessary (para 4-13b).
		b. Power cable disconnected.	*b.* Check to see that the power cable is securely connected.
2	POWER indicator lamp lights but test set is not operable.	*a.* Defective 3A fuse.	*a.* Replace fuse F2 or F3.
		b. Defective power supply.	*b.* Refer to higher category of maintenance.
3	The test set is operable, but the test adapter is not operable.	*a.* Loose adapter cable connection.	*a.* Check that adapter cable is securely connected.
		b. Damaged cable	*b.* Refer to higher category of maintenance.
4	Test set is operable with test adapter connected but either —12V or +12V lamp does not light.	Defective lamp.	Replace lamp (para 4-13*a*).

4-13. Replacement of Parts

a. Replace the POWER, LINE, and RING indicator lamps as follows:

(1) Turn the glass indicator lens counterclockwise and pull it out.

NOTE:

The defective lamp remains with the lens.

(2) Slide the defective lamp out of the lens and replace it with a new one by pushing it into the recess in the lens.

(3) Place the indicator lens with lamp in its receptacle and turn it clockwise.

b. Replace fuses as follows:

(1) Turn the fuse cap counterclockwise and pull it out to expose the defective fuse.

(2) Pull the defective fuse out of the cap and replace it with a new one.

(3) Place the fuse cap in its receptacle and turn it clockwise.

c. Replace rotary switch knobs as follows:

(1) Turn the switch to its farthest counterclockwise position and loosen the setscrew.

(2) Pull the defective knob off and replace it with a new one.

(3) Align the white arrow on the knob with OFF (with COM EQUIP on the TEST MODE switch), and tighten the setscrew.

CHAPTER 5

SHIPMENT, LIMITED STORAGE, AND DEMOLITION

Section I. DISASSEMBLY AND REPACKAGING

5-1. Disassembly Procedures

Tactical situations dictate the time available and the amount of effort that can be given to preparing the test set for shipment and limited storage. The procedures given below are typical procedures to be followed when the test set is to be moved to another location or placed in limited storage.

a. Return all switches to their OFF positions.

b. Disconnect the power cable assembly from the test set and the power source.

c. Disconnect the interconnecting cable assemblies from the connecting group and the test set.

d. Disconnect the test adapter from the test set.

NOTE:

If the test set is rack mounted, perform the following procedures, otherwise proceed to *g* below.

e. Remove the test set from the rack by removing the eight screws, flat washers and lockwashers that secure it to the rack.

f. Slide the test set into its transit case and secure it with the same eight screws, flat washers, and lockwashers that secured it to the rack.

g. Secure the test adapter, power cable assembly, and control cable assembly in the front cover.

h. Secure the other two cable assemblies in the rear cover.

i. Secure the front and rear covers onto the transit case.

5-2. Repackaging for Shipment or Limited Storage

Repackaging the equipment for shipment or limited storage will normally be performed at a packaging facility or by a repackaging team. If the organization is to repackage the equipment, select the materials from those listed in SB 38-100. Package the equipment in accordance with the original packaging (fig. 2-1) so far as possible with the available materials. The carton is approximately 22 1/2 by 18 by 13 inches.

Section II. DEMOLITION PROCEDURES

5-3. Authority for Demolition

Demolition of the equipment will be done only upon order of the commander. Use the destruction procedures outlined in paragraph 5-4 to prevent further use of the equipment, either by repair or cannibalization.

NOTE:

The standard procedures for destruction of the overall system, of which the test set is a part, include destruction of the test set when installed.

5-4. Methods of Destruction

Use any of the following methods to destroy the equipment.

a. Smash. Smash the controls, the switches, the test adapter, and the printed circuit boards, use sledges, axes, handaxes, pickaxes, or crowbars.

b. Cut. Cut the interconnecting cables and the power cable; use axes, handaxes, or machetes.

c. Burn. Burn the cables and the technical manuals; use gasoline, kerosene, oil, flamethrowers, or incendiary grenades.

d. Bend. Bend the panels and the transit case.

e. Explode. If explosives are necessary, use firearms, grenades or TNT.

f. Dispose. Bury or scatter the destroyed parts in slit trenches or foxholes, or throw them into streams.

5-5. Priorities for Destruction

Destroy the components in the following sequence:

NOTE:

If any classified documents are on hand and cannot be evacuated, be sure to destroy them before destroying any other item.

a. Test set.
b. Test adapter
c. Cable assemblies.

APPENDIX A

REFERENCES

The following publications contain information of interest to the user and organizational repairman of Telephone Test Set AN/FCM-15.

DA Pam 310-4	Index of Technical Manuals, Technical Bulletins, Supply Manuals (Types 7, 8, and 9) Supply Bulletins, and Lubrication Orders
DA Pam 310-7	US Army Equipment Index of Modification Work Orders
SB 11-244	Stockage of Signal Items for Use as Maintenance Float (Exchange)
SB 38-100	Preservation, Packaging, and Packing Materials, Supplies, and Equipment Used by the Army.
TB 746-10	Field Instructions for Painting and Preserving Electronics Command Equipment
TM 11-5805-467-12	Operator and Organizational Maintenance Manual: Telephone Connecting Group AN/FCA-17.
TM 11-6625-366-15	Organizational, DS, GS, and Depot Maintenance Manual: Multimeter TS-352B/U
TM 11-6625-535-15	Operator, Organizational, DS, GS, and Depot Maintenance Manual: Oscilloscope AN/USM-140A
TM 58-750	Army Equipment Record Procedures

APPENDIX B

BASIC ISSUE ITEMS

Section I. INTRODUCTION

B-1. Scope

This appendix lists items comprising an operable equipment and those required for installation, operation, or operator's maintenance for Telephone Test Set AN/FCM-15.

B-2. Explanation of Columns

The following is a list of explanations of columns in section II.

a. Source, Maintenance, and Recoverability Codes (SMR) Column.

(1) *Source code (S).* The selection status and source for the listed item is the first code indicated in this column. The source code used and its explanation is—

Code	*Explanation*
P—	Applies to repair parts that are stocked in or supplied from GSA/DSA, or Army Supply system, and authorized for use at indicated maintenance categories.

(2) *Maintenance code (M).* The lowest category of maintenance authorized to install the item is indicated by the second code in the column. The maintenance category codes and their explanations are—

Code	*Explanation*
C	Operator/crew
O	Organizational maintenance

(3) *Recoverability code (R).* The recoverability code is the third code in the column. It indicates whether unserviceable items should be returned for recoverability or salvage. Recoverability code and its explanation is as follows:

NOTE

When no code is indicated in the recoverability column, the part will be considered expendable.

Code	*Explanation*
R—	Applies to repair parts and assemblies that are economically repairable at DSU and GSU activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number Column. This column indicates the Federal stock number for the item.

c. Description Column. This column indicates the Federal item name and any additional description of the item which may be required. A part number or other reference number is followed by the applicable five-digit Federal supply code for manufacturers. Usable on code column is not used.

d. Unit of Issue Column. The unit used as a basis of issue (e.g., ea, pr, ft, yd, etc.) is given in this column.

e. Quantity Incorporated in Unit Pack Column. Not used.

f. Quantity Incorporated in Unit Column. The total quantity of the items used in the equipment is given in this column.

g. Quantity Furnished With Equipment Column. This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

h. Quantity Authorized Column. Not used.

i. Illustrations Column.

(1) *Figure number (a).* The number of the illustration in which the item is shown is indicated in this column.

(2) *Item No. or reference designation (b).* Not applicable.

B-3. Federal Supply Codes

This paragraph lists the Federal supply code with the associated manufacturer's name.

Code	*Manufacturer*
27040	Comtech Corp.
75915	Littelfuse, Inc.
08806	General Electric Corp.

SECTION II. BASIC ISSUE ITEMS

(1) SMR CODE	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION Reference Number & Mfr Code / USABLE ON CODE	(4) UNIT OF ISSUE	(5) QTY INC IN UNIT PACK	(6) QTY INC IN UNIT	(7) QTY FURN WITH EQUIP	(8) QTY AUTH	(9) ILLUSTRATIONS (a) FIG. NO.	(9) ILLUSTRATIONS (b) ITEM NO. OR REFERENCE DESIGNATION
	6625-497-9798	TELEPHONE TEST SET 80058, AN/PCM-15						1-1	
		ARMY TECHNICAL MANUAL TM 11-6625-1841-12	ea			1			
		Requisition through pinpoint account number, if assigned; otherwise through nearest Adjutant General Office.							
		No Basic Issue Items are mounted in or on the equipment.							
		No accessories tools and test equipment are to be issued with this equipment							
		The following parts are authorized Operator/Crew							
PO	5920-280-5062	FUSE, CARTRIDGE: 71915; 312002	ea			5		1-1	
PO	5920-356-2199	FUSE, CARTRIDGE: 71915; 312003	ea			5		1-1	
PO	6240-892-4420	LAMP, GLOW: 08806; NE2D	ea			3		1-1	
PO	6240-875-7981	LAMP, INCANDESCENT: 08806; 394	ea			4		1-1	

APPENDIX C

MAINTENANCE ALLOCATION

Section I. INTRODUCTION

C-1. General

This appendix provides a summary of the maintenance operations covered in the equipment literature for Telephone Test Set AN/FCM-15. It authorizes categories of maintenance for specific maintenance functions on repairable items and components and the tools and equipment required to perform each function. This appendix may be used as an aid in planning maintenance operations.

C-2. Explanation of Format for Maintenance Allocation Chart

a. Group Number. Group numbers correspond to the reference designation prefix assigned in accordance with ASA Y32.16, *Electrical and Electronics Reference Designations.* They indicate the relation of listed items to the next higher assembly.

b. Component Assembly Nomenclature. This column lists the item names of component units, assemblies, subassemblies, and modules on which maintenance is authorized.

c. Maintenance Function. This column indicates the maintenance category at which performance of the specific maintenance function is authorized. Authorization to perform a function at any category also includes authorization to perform that function at higher categories. The codes used represent the various maintenance categories as follows:

Code	*Maintenancy category*
C	Operator/crew
O	Organizational maintenance
F	Direct support maintenance
H	General support maintenance
D	Depot maintenance

d. Tools and Equipment. The numbers appearing in this column refer to specific tools and equipment which are identified by these numbers in section III.

e. Remarks. Self-explanatory.

C-3. Explanation of Format for Tool and Test Equipment Requirements

The columns in the tool and test equipment requirements chart are as follows:

a. Tools and Equipment. The numbers in this column coincide with the numbers used in the tools and equipment column of the MAC. The numbers indicate the applicable tool for the maintenance function.

b. Maintenance Category. The codes in this column indicate the maintenance category normally allocated the facility.

c. Nomenclature. This column lists tools, test, and maintenance equipment required to perform the maintenance functions.

d. Federal Stock Number. This column lists the Federal stock number.

e. Tool Number. Self-explanatory.

Section II. MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
1	TEST SET AN/FCM-15	O	O	O					O	O			1 and 2	See Note 1.
			F						F	F			1 thru 5	See Note 2.
			H		H				H	H			1, 2, & 3	See Note 2.
										D				
1A	TEST SET TS-2939/FCM-15	O	O	O					O	O			1 and 2	See Note 1.
			F						F	F			1, 2, & 3	See Note 2.
			H		H				H	H			1, 2, & 3	See Note 2.
										D				
1A1	COMMON CHASSIS PARTS		F						F				1 and 2	
1A1A1	TERMINAL BOARD ASSEMBLY		F						F				1 and 2	
										D				
1A2	RINGING GENERATOR		F						F				1, 2, & 3	
			H		H					H			1, 2, & 3	
1A2A1	RINGING GENERATOR SUBASSEMBLY		H		H				H				1, 2, & 3	
										D				
1A3 thru 1A13	MAGNETO LINE CIRCUITS		F						F				1, 2, & 3	
										D				

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
1A14	INTERRUPTER CIRCUIT		F						F				1, 2, & 3	
										D				
1A15 thru 1A20	LINE NIGHT ALARM (2 CIRCUITS/BOARD)		F						F				1, 2, & 3	
										D				
1PS1	POWER SUPPLY		F						F				1, 2, & 3	
			H		H					H			1, 2, & 3	
1PS1A1	POWER SUPPLY SUBASSEMBLY		H		H				H				1, 2, & 3	
										D				
1B	ADAPTER, TEST MX-8535/FCM-15	O	O	O					O	O			1 and 2	See Note 3.
			F							F			1 and 2	
1C	CABLE ASSEMBLY, POWER ELECTRICAL (1W1) CX-10793/FCM-15	O	O	O					O				1 and 2	Continuity Test
			F							F			1 and 2	See Note 4.
1D	CABLE ASSEMBLY SPECIAL PURPOSE ELECTRONIC BRANCHED (1W2) CX-12213/FCM-15	O	O	O					O				1 and 2	Continuity Test
			F							F			1, 2, 4, & 5	
1E	CABLE ASSEMBLY SPECIAL PURPOSE ELECTRICAL (1W3) CX-12214/FCM-15	O	O	O					O				1 and 2	Continuity Test
			F							F			1, 2, 4, & 5	

MAINTENANCE ALLOCATION CHART

GROUP NUMBER	COMPONENT ASSEMBLY NOMENCLATURE	MAINTENANCE FUNCTIONS											TOOLS AND EQUIPMENT	REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD		
1F	CABLE ASSEMBLY, SPECIAL PURPOSE, ELECTRICAL (1W4) CX-10792/U	0	0	0					0				1 and 2	Continuity Test
			F							F			1, 2, 4, & 5	
1G	CASE, TEST SET CY-6793/FCM-15	0		0					0				1	
1H	COVER, TEST SET CASE CW-1093/FCM-15	0		0					0				1	

Note 1.

D/S will perform organizational maintenance . Organizational test is limited to equipment operation and continuity tests where applicable. Repair will be limited to replacement of fuses, knobs, lenses, and lamps.

Note 2.

Replace & Repair indicated by listed component break-down.

Note 3.

Continuity Test & Repair limited to lenses and lamps.

Note 4.

Replace Connector P1 only.

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

TOOLS AND EQUIPMENT	MAINTENANCE CATEGORY	NOMENCLATURE	FEDERAL STOCK NUMBER	TOOL NUMBER
1	O, F, H, & D	TOOL KIT, ELECTRONIC EQUIPMENT TK-105/G	5180-610-8177	
2	O, F, H, & D	MULTIMETER TS-352B/U	6625-242-5023	
3	F, H, & D	OSCILLOSCOPE AN/USM-140(*)	6625-987-6603	
4	F, H, & D	PIN EXTRACTOR (BURNDY RX20-25V2)	5120-877-1129	
5	F, H, & D	CRIMPING TOOL, CONTACT, HAND MIL-T-22520 (PART OF MAINTENANCE KIT MK-693/A, 5821-045-9695)	5120-924-7811	MS 31-91-A

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:
KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

DISTRIBUTION:

Active Army:

ACSC-E (2)
CofSptS (1)
USAMB (10)
USACDCEC (10)
USACDCEC
Ft Huachuca (1)
USAMC (2)
LBAD (10)
SAAD (15)
TOAD (10)
LEAD (7)
AAF (5)
8th US Army

NG: None.

USAR: None

For explanation of abbreviations used, see AR 310-50

☆ U. S. GOVERNMENT PRINTING OFFICE: 1970—397-091/103